Rejections under 35 U.S.C. §112

The Office Action rejected claims 1, 2, 4-15, 17-19 and 21-32 under 35 U.S.C. §112, second paragraph, asserting that the terms "can be used" and "being usable" in claims 1, 2, 4-15, 17-19, and 21-32 are intended use terms and are indefinite (*see* Office Action, ¶4, page 2). Applicant respectfully disagrees.

The phrases "can be used" and "being usable," as used in the claims, are not intended use terms. Rather, these phrases are functional limitations that describe a characteristic of an enterprise logical volume identifier (ELVID). As the MPEP makes clear, such limitations are entirely proper:

> "[a] functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms...It was held that the limitation used to define a radical on a chemical as 'incapable of forming a dye with said oxidizing developing agent' although functional, was perfectly acceptable because it set definite boundaries on the patent protection sought."

See MPEP §2173.05(g), page 2100-213 of 8th edition, Rev. 2, May 2004, quoting *In re Barr*, 444 F.2d 588 (CCPA 1971).

Claim 1 recites that, "...the ELVID uniquely identifies the one of the plurality of logical volumes, so that the ELVID can be used to access the one of the plurality of logical volumes on at least two of the plurality of storage systems..." The claim does not state an intended use as it does not require that the ELVID be used to access a logical volume on at least two storage systems. Rather, the above-quoted language merely recites a characteristic of the ELVID (i.e., that it is capable of being used to access a logical volume on at least two storage systems). In the example provided in MPEP §2173.05, the claim language "incapable of forming a dye with said oxidizing developing agent" defined a characteristic of a radical on a chemical and was deemed to have satisfied the requirements of 35 U.S.C. §112, second paragraph. Similarly, the phrase "so that the ELVID can be used to access the one of the plurality of logical volumes on at least

two of the plurality of storage systems," recited in claim 1 defines a characteristic of the ELVID and does not state an intended use.

Thus, claim 1 is definite and satisfies the requirements of 35 U.S.C. §112, second paragraph. Accordingly, it is respectfully requested that the rejection of claim 1 under 35 U.S.C. §112 be withdrawn. Claims 2 and 4-14 were rejected under 35 U.S.C. §112 based on their dependency from claim 1. Accordingly, in view of the discussion above, it is respectfully requested that the rejection of claims 2 and 4-14 under 35 U.S.C. §112 be withdrawn.

Independent claims 15, 26, 27, 29, 31, and 32 each include a limitation reciting an ELVID "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems," "uniquely identifying the correct one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the correct one of the plurality of logical volumes on at least two of the plurality of storage systems," or "uniquely identifying the requested one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the requested one of the plurality of logical volumes on at least two of the plurality of storage systems."

As should be clear from the discussion above, the phrase "being usable" in these claims is not an intended use term, but rather a functional limitation that describes a characteristic of an ELVID. Thus, these claims meet the requirements of 35 U.S.C. §112, second paragraph. Accordingly, it is respectfully requested that the rejection of claims 15, 26, 27, 29, 31, and 32 under 35 U.S.C. §112 be withdrawn.

Each of claims 17-19, 21-25, 28 and 30 was rejected under 35 U.S.C. §112 based on its dependency from its respective independent claim discussed above. Accordingly, in view of the foregoing discussion, it is respectfully requested that the rejection of claims 17-19, 21-25, 28 and 30 under 35 U.S.C. §112 be withdrawn.

REJECTION UNDER 35 U.S.C. §102

The Office Action rejected claim 26 under 35 U.S.C. §102(b) as purportedly being anticipated by Baranovsky (5,897,661). Applicant respectfully traverses this rejection.

Baranovsky is directed to a data storage system comprising a general purpose computer executing a logical volume manager (LVM) (Col. 7, lines 50-60). The LVM manages

collections of disk drives, referred to as physical volumes (PVs), which are attached to the computer on which the LVM is running (Col. 8, lines 11-24). The PVs are logically grouped together by the LVM to form physical volume groups (PVGs) (Col. 8, lines 24-35). One or more logical volumes (LV) may be stored on a PVG (Col. 8, lines 52-56). A PVG may be made up of a multiple disk drives, or PVs, thus allowing different portions of a logical volume to be physically stored across multiple PVs (Col. 8, lines 60-66). However, each logical volume must be entirely stored within a single PVG and cannot be distributed across multiple PVGs (Col. 8, lines 52-59).

Baranovsky does not disclose or suggest an enterprise logical volume identifier (ELVID) "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems," as recited in claim 26. Rather, Baranovsky discloses a system that includes only a single computer that stores logical volumes. Thus, the logical volume identifiers used to identify these logical volumes are only usable within the single computer and are not usable to access logical volumes on at least two of the plurality of storage systems.

Indeed, as shown in Figure 1, Baranovsky discloses a single computer that includes a direct access storage device (DASD) 20. DASD 20 includes the plurality of disk drives that form the PVGs (Baranovsky, Col. 5, lines 55-65). Thus, the logical volumes disclosed by Baranovsky are all stored in a single computer. There is no disclosure or suggestion in Baranovsky that the logical volume identifiers are capable of being used on two or more computers, as Baranovsky is directed to a system comprising only a single computer.

Further, the logical volumes disclosed by Baranovsky do not have logical volume identifiers, "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes," as recited in claim 26. A logical volume identifier in Baranovsky does not even uniquely identify all logical volumes stored on DASD 20 of the computer, let alone a plurality of logical volumes stored on multiple storage systems. A logical volume identifier in Baranovsky is unique only within a single PVG. That is, two different logical volumes that are stored on different PVGs of the computer may have the same logical volume identifier. For example, at column 12, lines 1-25, Baranovsky discloses that each physical volume (PV) in a PVG (i.e., each disk in a collection of disks) receives an identifier that is internal to the PVG and is only unique within that particular PVG and each logical volume also receives an internal

identifier that is internal to the particular PVG in which the logical volume is stored. This is different from an ELVID that uniquely identifies a logical volume among a plurality of logical volumes stored on a plurality of storage systems. There is no disclosure or suggestion in Baranovsky that logical volume identifiers are unique across multiple storage systems or are even unique across multiple PVGs within a single computer.

Thus, claim 26 patentably distinguishes over Baranovsky. Accordingly, it is respectfully requested that the rejection of claim 26 under 35 U.S.C. §102(b) be withdrawn.

REJECTIONS UNDER 35 U.S.C. §103

The Examiner rejected claims 1, 2, 4-15, 17-19, 21-25, and 27-32 under 35 U.S.C. §103(a) as being unpatentable over Baranovsky in view of Hubis (6,343,324). Applicant traverses this rejection and respectfully points out that the Office Action has failed to establish a *prima facie* case of obviousness for two reasons. First, one of skill in the art would not have been motivated to combine the references in the manner suggested in the Office Action. Second, even if one were motivated to combine the references in the manner alleged, the claims patentably distinguish over any such combination.

There Is No Motivation To Combine The References

Hubis discloses a method for controlling access to a shared storage device, such as a disk drive storage array (Abstract). The method includes steps of: associating a locally-unique identifier with each of the plurality of computers defining a data structure in a memory; identifying which particular ones of the computers based on the locally unique identifier may be granted access to the device; and querying the data structure to determine if a requesting one of computers should be granted access to the hardware device (Abstract). The system limits access to a volume of storage 108 on, or controlled by, the rate controller 106 to a specific set of host computers 101, as identified by a unique identifier (for example, the world wide name (WWN) 107 associated with the host computer 101 via its network interface) (Col. 4, lines 48-52, emphasis added). A host is allowed access to a volume based on information stored in a host WWN list, volume WWN tables, and volume permission tables (Col. 9, lines 1-4). As shown in Figures 2B-3, a particular logical volume of an I/O processor associated with a controller

includes a volume permission table (190) that identifies, for a particular host index in the volume WWN table, whether the host is granted access to that particular logical volume (Col. 11, lines 1-7).

The Office Action asserts that one of skill in the art would have been motivated to modify the system of Baranovsky, based on the purported teaching of Hubis, to include, "in response to the access request, verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address because it provides for security and to avoid error and corruption of information." (*See* Office Action, page 5, lines 17-22). Applicant respectfully disagrees.

As discussed above, Baranovsky is directed to a system having only a single computer. As shown in Figure 5, a user of the computer accesses data stored in logical volumes by opening a file in a file system. The file system then maps this file to a logical storage location in a particular logical volume. The logical volume manager then maps this logical storage location to a particular physical storage location or set of storage locations. Thus, an access request to the logical volume manager specifies only a location within a particular logical volume and does not specify the corresponding physical storage location. The logical volume manager determines, by itself, what physical storage location corresponds to the requested logical storage location.

Thus, in Baranovsky there is no need (and in fact it is impossible) to verify that the logical volume identified in the access request is stored in the physical storage location specified in the access request because there is no physical storage location specified in the access request. A physical storage location cannot be verified if one is not specified. Thus, one of skill in the art would not have been motivated to modify the system of Baranovsky to perform a step of "verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage system specified in the physical storage address," as purportedly taught by Hubis, because in the system of Baranovsky there is no physical storage address specified that the system may verify.

The Office Action further asserts that one skilled in the art would have been motivated to modify the system of Baranovsky, based on the teaching of Hubis, to include using the ELVID to assure that an entity requesting access to the one of the plurality of logical volumes is authorized to do so because it provides for security and to avoid error and corruption of information (*See* Office Action, page 9, lines 13-17). Applicant respectfully disagrees.

As discussed above, Baranovsky is directed to a single general purpose computer that is intended for use by a single user who is operating the computer. For example, as shown in Figure 1 of Baranovsky, the computer includes a keyboard 24, a mouse 26, a joystick 32, and a display 38 that allows the user to provide input to the computer and view output from the computer. Because the computer of Baranovsky is intended for use by a single user sitting at the terminal, there would have been no reason to incorporate the access permissions scheme for controlling access to logical volumes by multiple users into the system of Baranovsky. Thus, one of skill in the art would not have been motivated to modify the system of Baranovsky to include the access permission verification techniques taught by Hubis.

For the foregoing reasons, one of skill in the art would not have been motivated to modify the system Baranovsky based on the teachings of Hubis in the manner alleged in the Office Action. Thus, the Office Action has failed to establish a *prima facie* case of obviousness and it is respectfully requested that rejection of claims 1, 2, 4-15, 17-19, 21-25, and 27-32 under 35 U.S.C. §103(a) be withdrawn.

The Claims Distinguish Over The Combination Of Baranovsky and Hubis

Even if one were to combine Baranovsky and Hubis, Applicant's claims still patentably distinguish over any such combination.

Claim 1

Claim 1 is directed to a method of accessing one of a plurality of logical volumes stored on a plurality of storage systems in an enterprise, the one of the plurality of logical volumes being stored on at least one of the storage systems, the method comprising steps of: receiving from a host computer an access request to access data stored on the one of the plurality of logical volumes, the access request specifying an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes and a physical storage address for the one of the plurality of logical volumes, wherein the ELVID uniquely identifies the one of the plurality of logical volumes among the plurality of logical volumes, so that the ELVID can be used to access the one of the plurality of logical volumes on at least two of the plurality of storage systems, and wherein the physical storage address specifies one of the plurality of storage systems in the enterprise; and in response to the access request, verifying that the one of the plurality of logical volumes

corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address.

As should be clear from the discussion above, Baranovsky does not disclose or suggest an ELVID that "uniquely identifies the one of the plurality of logical volumes among the plurality of logical volumes, so that the ELVID can be used to access the one of the plurality of logical volumes on at least two of the plurality of storage systems, and wherein the physical storage address specifies one of the plurality of storage systems in the enterprise." Hubis does not cure this infirmity of Baranovsky, as Hubis altogether fails to disclose a logical volume identifier that is unique with respect to any other one of the plurality of logical volumes stored in the system.

In addition, neither reference discloses or suggests, "verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address." The Office Action concedes that Baranovsky does not disclose this limitation, but asserts that Hubis discloses it at: Figure 3B; column 3, lines 48-59; column 4, lines 10-19; column 13, lines 18-32; and column 12, lines 1-24. (*See* Office Action, page 5, lines 6-11). Applicant respectfully disagrees that Hubis discloses this limitation of claim 1.

The cited portions of Hubis relate to verifying that a host requesting access to a particular logical volume has been granted permission to the logical volume. Nowhere does Hubis discuss verifying that the mapping between a logical volume identifier and the physical storage location of its corresponding logical volume is correct. Hubis relates to verifying access permissions, not verifying logical-to-physical mappings. Thus, Hubis does not disclose or suggest, "verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address," as recited in claim 1.

Thus, claim 1 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 1 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claims 2 and 4-14 depend from claim 1 and are patentable for at least the same reasons.

Claim 15

Claim 15 is directed to a method of accessing one of a plurality of logical volumes stored on a plurality of storage systems in an enterprise, the one of the plurality of logical volumes being stored on at least one of the storage systems, the method comprising steps of: receiving from a host computer an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes; receiving from the host computer a physical storage address for the one of the plurality of logical volumes; and using the ELVID to assure that an entity requesting access to the one of the plurality of logical volumes is authorized to do so, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above neither Baranovsky nor Hubis discloses or suggests an ELVID "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems," as recited in claim 15.

Thus, claim 15 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 15 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claims 17-19 and 21-25 depend from claim 15 and are patentable for at least the same reasons.

Claim 27

Claim 27 is directed to a storage system for use in an enterprise comprising a plurality of storage systems coupled by a network, the plurality of storage systems to store a plurality of logical volumes, the storage system comprising: an input for receiving an access request that includes an enterprise logical volume identifier (ELVID) for a logical volume and a physical storage address that identifies one of the plurality of storage systems; a storage medium to store data corresponding to the plurality of logical volumes; and an ELVID verifier module to verify that the logical volume corresponding to the ELVID is stored on the one of the plurality of storage systems identified in the physical storage address, the ELVID uniquely identifying the correct one of the plurality of logical volumes among the plurality of logical volumes and being

usable to access the correct one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID "uniquely identifying the correct one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the correct one of the plurality of logical volumes on at least two of the plurality of storage systems" or "an ELVID verifier module to verify that the logical volume corresponding to the ELVID is stored on the one of the plurality of storage systems identified in the physical storage address," as recited in claim 27.

Thus, claim 27 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 27 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 28 depends from claim 27 and is patentable for at least the same reasons.

Claim 29

Claim 29 is directed to a storage system for use in an enterprise comprising a plurality of storage systems coupled by a network, the plurality of storage systems to store a plurality of logical volumes. The storage system comprises: a storage medium to store data corresponding to the plurality of logical volumes; and an enterprise logical volume identifier (ELVID) authorization module to verify that an access request to a physical storage location on the storage medium is received from an entity permitted to access one of the plurality of logical volumes with a corresponding ELVID, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems," as recited in claim 29.

Thus, claim 29 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 29 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 30 depends from claim 29 and is patentable for at least the same reasons.

Claim 31

Claim 31 is directed to a computer system comprising: at least one host computer; a plurality of storage systems that store a plurality of logical volumes; means for receiving an access request to access data stored on one of the plurality of logical volumes, the access request specifying an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes and a physical storage address for the one of the plurality of logical volumes; and means for verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID "uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems" or "means for verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address," as recited in claim 31.

Thus, claim 31 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 31 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 32

Claim 32 is directed to a computer system comprising: at least one host computer; a plurality of storage systems that store a plurality of logical volumes; and means for verifying that access requests to the plurality of logical volumes using an associated enterprise logical volume identifier (ELVID) are made by an entity authorized to access a requested one of the plurality of logical volumes, the ELVID uniquely identifying the requested one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the requested one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID "uniquely identifying the requested one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the requested one of the plurality of logical volumes on at least two of the plurality of storage systems," as recited in claim 32.

Thus, claim 32 patentably distinguishes over Baranovsky and Hubis, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 32 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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